

newly organized Rio Grande Valley extension of the Weather Bureau River and Flood Service:

The Weather Bureau's scope of usefulness has been largely increased by the preparation and issuance of bulletins on the rise of the various rivers in Colorado and New Mexico, and hereafter the farmers will have no excuse for losses of crops by floods of which they had not been warned.

The new system was inaugurated on May 1, and bulletins were furnished to points along the Rio Grande River. Every rise was foretold from two to five days ahead, and the height was given within a tenth of a foot. The residents of Albuquerque, Rincon, Las Cruces, and other points were warned of the floods, which occurred Saturday and Sunday, as early as last Thursday.

On Thursday of last week a bulletin was telegraphed to El Paso that the Rio Grande River would reach its highest point of the season yesterday and that it would reach a height of 13.7 feet. Yesterday afternoon Forecaster Brandenburg received a telegram from El Paso stating that the river had reached the height of exactly 13.7 feet.

At the same time Rincon, Las Cruces, Engle, Socorro, and Albuquerque were warned that the river would reach the same height as that reached in the memorable flood of last October. The warning was heeded to a certain extent, and where it was the damage was minimized.

The success of the system has resulted in ordering a similar service for the Arkansas River east of Pueblo, including the Purgatoire, or the Picket Wire, as it is called, from Trinidad to Las Animas. The service will also be installed on the Pecos River in eastern New Mexico and western Texas, and on the Canadian River.

BOSTON FORECAST DISTRICT.

The month, as a whole, was dry, cold, and unpleasant for the season of the year. Snow fell in many sections on the 1st, with amounts ranging from a trace to several inches. Frosts occurred throughout the section, particularly on the 24th, and in parts of the Northern States the ground froze and ice formed on still, shallow water. In sections where the cold was severe, vegetation was not sufficiently advanced to suffer much damage. The small amount of precipitation was the most conspicuous feature of the month. The average for the month for the entire district, 1.82 inches, is the smallest for May in the history of the New England Weather Service, except 1.79 inches in 1899, and 0.68 of an inch in 1903, and it is a little more than 50 per cent of the normal for the month. The month was devoid of severe storms or high winds and gales. There was, however, more than the usual amount of fog, of which there was considerable complaint. No storm warnings were issued during the month and there was no delay to shipping by reason of high winds.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

No general storm appeared in the district during the month and no special warnings were issued. Severe local storms occurred on several dates and forecasts for thunderstorms had been issued in nearly every instance. The latter part of the month was unusually wet over a great part of the district.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

The upper Lakes were comparatively free from storms. Storm warnings were ordered on only a few dates during the first half of the month, and, as a rule, only the lighter craft were inconvenienced, and no wrecks occurred as far as known. Frost warnings were issued on several dates and the cranberry growers of Wisconsin were carefully advised previous to the occurrence of each frost.—*H. J. Cox, Professor and District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

There were no severe or damaging storms in the district, although a number of thunderstorms occurred, attended by heavy rainfall, and some by hail. Light frost occurred in the extreme northern portion of the district on the morning of the 1st, and a cool spell prevailed from the 15th to 20th.—*Ferdinand J. Walz, District Forecaster.*

DENVER FORECAST DISTRICT.

The month was cold throughout the district, with an excess of precipitation in the northern part and a marked deficiency

on the southern slope. Vegetation remains backward, owing to the frequent frosts, nearly all of which were forecast. The cooler weather retarded the melting of snow in the high mountains of Colorado, but on the southern slope, where high temperatures prevailed, there was a rapid melting of snow even at the highest altitudes. Streams were badly swollen from the beginning of the month; destructive floods, warnings of which were timely, occurred in the lower Rio Grande during the latter half; during the closing days of the month points below San Marcial were advised that the water would reach or come within one foot of the flood of last fall. At El Paso active preparations were made for the flood and all possible steps were taken to minimize damage.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

Unsettled weather prevailed throughout the month. Heavy rainfalls occurred and over the southern half of the Sierra Nevada Mountains the snowfall was heavy.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

No severe general storm passed over the district. Local storms, accompanied by heavy rainfalls, occurred frequently in the mountain districts, and some loss of life and considerable damage to farm property was caused in some localities by sudden floods sweeping down the steep canyons. Frost warnings were issued to points east of the Cascade Mountains when conditions demanded them, and as a rule the warnings were successful.—*A. B. Wollaber, Acting District Forecaster.*

RIVERS AND FLOODS.

The moderate floods in the Texas rivers continued during the first few days of the month, and additional warnings were issued May 1. The heavy rains of the 13th and 14th started another decided rise, and warnings of dangerous rises in the Brazos and Trinity rivers were issued on the 14th and 15th. The stages reached were from two to nine feet above the danger lines, but it is thought that no serious losses occurred, except such as were absolutely unavoidable. The rivers continued comparatively high over their lower reaches until the end of the month.

The Red River was high throughout the month as a result of the numerous heavy rains, and warnings were first issued on the 13th. The danger line of 28 feet was passed at Fulton, Ark., on the 16th, and by the end of the month the entire river from Fulton southward was from 2.5 to 3.5 feet above the danger line. A full report of this flood will appear in the Review for June, 1905.

The lower Arkansas, White, Ouachita, and Atchafalaya rivers were also in moderate flood, and stages several feet above the danger lines were quite general, except in the Arkansas River. The usual warnings were issued for these floods.

There were heavy rains and snows over the mountainous upper watershed of the Rio Grande beginning about the 15th, and on the 18th it became necessary to issue another flood warning to points between Albuquerque, N. Mex., and El Paso, Tex. Supplementary warnings were issued almost daily thereafter, and the high water still continued at the close of the month. A report of this flood will appear in the Review for June, 1905.

There were also some moderately high waters in the lower Ohio and tributaries as a result of the heavy rains on the 12th, but danger-line stages were not quite reached except in the Ohio at Evansville, Ind., and in the Wabash and Duck rivers. Warnings were issued whenever necessary between the Great Kanawha River and Cairo, Ill. About 10,000 acres of farm land were overflowed from the mouth of Green River to Henderson, Ky.; about 7000 acres on the Indiana, and 3000 acres on the Kentucky side. Most of this land was planted in

corn and but little can be replanted. The amount of damage can not be given with any degree of accuracy, but it is apparent that the flood destroyed the excellent prospects that had previously been entertained of harvesting the largest corn crop of the last twenty years. Below Mount Vernon, Ind., stock was removed from the bottoms, and portable property protected, so that there was no loss except the labor of replanting corn lands that had been overflowed.

The Mississippi and Missouri rivers were higher than during the preceding month, but there were no floods.

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Division.

The following summaries relating to the general weather and crop conditions during May are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon reports from cooperative observers and crop correspondents, of whom there are about 3300 and 14,000, respectively:

Alabama.—Weather favorable for growth, though rainfall generally excessive, retarding work. Cotton made satisfactory stands and fairly good growth, though grass increased so rapidly that some fields were abandoned, labor scarce, some damage by lice; squares appeared on early planted during last week. Corn and minor crops advanced well; some corn damaged by worms and overflow; forward corn silking at close of month. Early peaches were ripening at end of month, and oat and wheat harvest active, wheat indicating light yield, oats satisfactory.—*F. P. Chaffee.*

Arizona.—Temperature greatly deficient. There was a generous supply of precipitation over the northern division, while over the southern and western divisions the shortage was extremely large. Phenomenally heavy snowfall 2d to 6th. Wheat, barley, and oat harvest general and garden truck, apricots, and figs plentiful throughout the central and southern divisions; yields large, quality excellent. Rapid progress in farm work in north division. Corn planting finished, stands good. Large shipments of berries, melons, and apricots. Mountains and streams contained an overabundance of water. Stock healthy. Second alfalfa cutting on the 25th.—*L. N. Jesunofsky.*

Arkansas.—The temperature was moderate and the rainfall unusually heavy. Owing to unfavorable weather cotton and corn planting was not completed during the month. Cotton came up to a fair stand, but made slow progress owing to lack of cultivation and to too much moisture. Chopping became fairly general by the close of the month. Corn was a fair stand, but was small and had poor color. Minor crops and fruits did well, although there was considerable complaint of apples dropping.—*Edward B. Richards.*

California.—Abnormally cool and generally cloudy weather during the greater part of the month retarded crop growth. Severe frosts caused some damage to deciduous fruits in the foothill districts, and in some sections new hay and early fruits were injured by heavy rain and hail. The rainfall was greatly in excess of the average in the Sacramento and San Joaquin valleys, and the temperature for the State was 3.6° below the normal. High winds and thunderstorms were of frequent occurrence.—*Alexander G. McAdie.*

Colorado.—Except in the southwestern counties during the last decade, conditions were generally unfavorable. Considerable damage by hailstorms occurred in localities on the eastern slope. At the close of the month seeding and planting were nearly finished, except in localities east of the mountains, where some sugar beets, potatoes, and corn remained to be planted, but early plantings were up; wheat, oats, rye, alfalfa, and grasses were doing well, and fruit prospects good.—*F. H. Brandenburg.*

Florida.—The month averaged warmer and wetter than the normal. Work advanced very well, except during a few days when it was retarded by too frequent rain. The bulk of the cotton crop was chopped out and the early planting took on some fruit. Some replanting was done on lowlands. The corn crop promised to be an excellent one. Citrus trees were vigorous. Cane, tobacco, and minor crops did well. Shipments of peaches, pineapples, and melons began.—*A. J. Mitchell.*

Georgia.—Month warm; too wet for farm work. Cotton planting completed by 15th; stand excellent; fields became very grassy, some abandoned; plants were generally healthy and made good growth where worked; some injury by lice; labor scarce. Corn progressed nicely; received insufficient cultivation; some injured by bud worms; laying by began south; late planting unfinished. Wheat yield shortened by rust. Oats generally fine. Early peaches began to ripen south, good yield, excellent quality; crop poor north.—*J. B. Marbury.*

Hawaii.—See Addendum et Corrigenda, on a subsequent page.

Idaho.—Cool weather retarded the growth of vegetation and some damage to fruit and tender vegetables resulted from frost, but at the close of the month most crops were in good condition. Ranges were unusually good and stock made excellent gains. An unusually heavy

The highest and lowest water, mean stage, and monthly range at 278 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

shower occurred in the mountains back of the city of Boise on the evening of the 27th, flooding a portion of the city for several hours; only slight damage resulted.—*Edward L. Wells.*

Illinois.—By the 15th corn was mostly planted in the central district. Wheat and rye were heading out. Clover was in bloom in the southern district. At the end of the month the bulk of the corn crop was in the ground in the region of heaviest production. Wheat, oats, rye, grasses, and potatoes were promising. Tree fruit, except peaches, gave promise of a fair yield, although much complaint was made of fruit falling.—*Wm. G. Burns.*

Indiana.—Owing to excess of moisture in the ground sowing oats was not finished until about the middle of the month and much corn ground had not been seeded at its close. Oats came up to a good stand and early corn did fairly well. Wheat, rye, clover, and timothy continued promising. Transplanting tomatoes and tobacco progressed satisfactorily the latter part of month. Field onions suffered from flooding. Apples, peaches, pears, and plums promised fair crops, cherries light; grapes and other small fruit good.—*W. T. Blythe.*

Iowa.—Month cooler than usual, with excessive rainfall in northern half of State; planting operations delayed and germination of corn retarded, conditions necessitating more than usual replanting. At close of month corn had made better stand than was previously anticipated and fields were being cultivated. Month was favorable for growth of wheat, oats, barley, rye, potatoes, and garden truck. Apples were generally promising, but cherries and plums were light; grapes and berry crop very good.—*John R. Sage.*

Kansas.—Wheat was heading in the southern counties the first week and in the northern the last week of the month. Corn planting was nearly finished the first week, much of it was up, and cultivation had begun. Oats improved slowly, began heading in the southern counties the third week and in the northern the last week. Grass improved. Alfalfa cutting began in southern counties first week, in northern by 15th, was damaged by frequent showers. Apples poor prospects in some counties, very promising in others.—*T. B. Jennings.*

Kentucky.—Temperature averaged slightly above normal, except in the south-central portion. Frost in the extreme northern counties on the 1st did no damage. Month generally favorable, but heavy rains caused damage in some localities. Wheat made excellent progress and condition was satisfactory in most sections. Oats, rye, and grasses were generally excellent. Potatoes grew nicely; tobacco was mostly set and looked vigorous. Corn planted, except where flooded, and mostly cultivated. Fruit dropping somewhat, but promised fair crop.—*F. J. Walz.*

Louisiana.—Favorable weather prevailed generally during early part of month, but frequent showers and occasionally heavy rains during latter half materially interfered with farming operations. The cotton crop was generally two to four weeks late, and planting continued in some sections; the bulk of the crop was badly in the grass at close of month and some lowland had been abandoned. The cane crop made good growth. Rice seeding progressed slowly and the crop was very backward. Corn suffered from too much rain, which prevented proper cultivation. Early corn was being laid by at close of month. Truck gardens yielded well.—*I. M. Cline.*

Maryland and Delaware.—Warm and droughty first half; good rains middle of month, followed by cool weather. Wheat made good heads. Oats had good stand and color, but were very backward. Corn was retarded by cool and dry weather and seriously devastated by cutworms. Grasses were short. Apples and cherries about average; pears below average; peaches light. Strawberries of fine quality were abundant. Other small fruits budded profusely. Little tobacco was set out, but plants were plentiful and thrifty. Gardens grew slowly.—*E. D. Emigh.*

Michigan.—The cool, wet weather of May, while generally favorable to wheat, rye, and meadows, interfered with planting and growth of corn, potatoes, and early beans, and retarded the growth of oats and barley. Continued wet weather blasted some fruit blossoms, especially cherries. Germination was slow, but fairly good. At close of month corn and sugar beet seeding was fairly well advanced, and early potatoes mostly planted. Wheat, rye, and meadows were in very promising condition at the end of the month.—*C. F. Schneider.*

Minnesota.—Wet weather until the 18th, and showery thereafter. Lowlands flooded and farm work hindered. Light frost 25th and 26th.